Update of "Technical guidelines for head and neck cancer IMRT on behalf of the Italian association of radiation oncology - head and neck working group"- Planning issues- page 10: STATIC-IMRT VERSUS VMAT IN HEAD AND NECK CANCER

A cura di Rosario Mazzola e Filippo Alongi
Division of Radiation Oncology, Sacro Cuore don Calabria hospital, Negrar-Verona

The main drawbacks of IMRT techniques are the more complex and time-consuming treatment planning process, the need for more accurate physics quality assurance and the increased radiation delivery time up to 30 minutes including IGRT. Static-IMRT uses a larger number of static beams and monitor units; in VMAT-treatment the gantry speed and dose rate vary continuously during delivery [1]. Regarding target coverage and OARs sparing comparison, available data are controversial and often affected by study endpoints adopted. There is no clear advantage (and possibly disadvantage) in terms of target coverage and OAR sparing of a technique over the other. To simplify, Intensity-modulated radiotherapy (IMRT) with its static beam directions might be advantageous in cases where steep dose gradients or highly intensity-modulated beam intensities are required in preferred directions. Volumetric-modulated arc therapy (VMAT) has been rapidly adopted by the radiotherapy community due primarily to its delivery speed and monitor unit efficiency, as well as the quality of conformal dose distributions achievable. Comparing to static-IMRT, several studies reported that treatment duration is significantly improved of 50% with VMAT-delivery, allowing to a possible reduction of the intra-fraction uncertainties [2-6].

Recently, some dosimetric studies using prototyped inverse planning algorithms have suggested the feasibility for mixed static-IMRT/VMAT techniques. The IMRT and VMAT deliveries are unified within the same arc, with IMRT being delivered at specific gantry angles within the arc. Optimized gantry angles for the IMRT and VMAT phases are assigned automatically by the inverse optimization algorithm.

The idea to combine VMAT and static-IMRT deliveries is not new, and various projects have been proposed to improve the current clinically available VMAT implementations. Compared with clinical VMAT or static-IMRT plans, Unified Intensity modulated Arc Therapy (UIMAT) has the potential to produce efficient and superior dose distribution, especially for complex anatomy such as in head-and-neck cancers [7].

References

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